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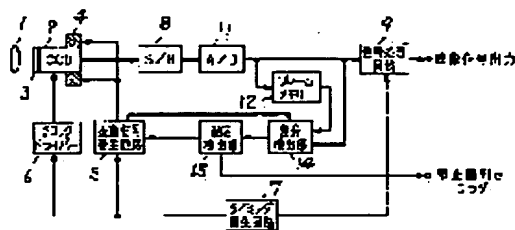
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(54) HIGH DEFINITION SOLID-STATE IMAGE PICKUP DEVICE

(57)Abstract:

PURPOSE: To attain a high definition image pickup operation by vibrating a CCD only when an object comes to a standstill to avoid blur even when the object moves.

CONSTITUTION: A noise in a video signal outputted from a CCD 2 is reduced by a sample-and-hold circuit 8, the resulting video signal is A/D-converted by an A/D converter 11 and the converted signal is once stored in a frame memory 12 and fed to a difference detection section 14 at a succeeding frame period, where a difference between a preceding frame image and a current frame image is detected, and its difference detection output is given to a motion detection section 15, which detects a movement of an object and a vibration signal generating circuit 5 vibrates a vibration element 4 for each frame if the object is at a standstill thereby allowing the CCD 2 connecting to the vibration element 4 to be vibrated. Thus, plural images with different sampling points are obtained for each frame and a high definition image is obtained by compositing output images from a signal processing section 9 at a next stage.



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高精細固体撮像装置

特開平7-245726

【特許請求の範囲】

【請求項1】 固体撮像素子と、前記固体撮像素子より出力される画像を記憶する記憶手段と、前記記憶手段出力より前記画像の動きを検出する動き検出手段と、前記動き検出手段出力に応じて振動信号を発生する振動信号発生手段と、前記振動信号発生手段より出力される振動信号により制御され、サンプリング点が異なるように前記固体撮像素子への入射光の光軸に対して少なくとも一方向に前記入射光の光軸または前記固体撮像素子を振動させる振動手段とを備え、前記画像が静止している場合のみ前記振動手段を動作させ、サンプリング点の異なる複数の画像を得るように構成されたことを特徴とする高精細固体撮像装置。

【請求項2】 固体撮像素子は、カラーフィルターの配列が、1行1列がマゼンダ、1行2列がグリーン、2行1列がイエロー、2行2列がシアン、3行1列がグリーン、3行2列がマゼンダ、4行1列がシアン、4行2列がイエローであり、この組み合わせもしくは上下対称または左右対称の組み合わせが水平方向と垂直方向に繰り返される配列であって、信号読み出し方法が全画素を同時に独立して読み出すことを特徴とする請求項1記載の高精細固体撮像装置。

【請求項3】 振動手段により発生される固体撮像素子の振動は、水平方向と垂直方向共に複数の振幅を具備し、水平方向の振幅と、垂直方向の振幅との比が常に同じであることを特徴とする請求項2記載の高精細固体撮像装置。

【請求項4】 振動手段により振動される固体撮像素子の位置が、基準位置である第1の位置と、前記基準位置に対して水平左方向に1/2画素間隔、垂直下方向に1/2画素間隔移動した第2の位置と、前記基準位置に対して水平左方向に1画素間隔、垂直下方向に1画素間隔移動した第3の位置もしくは上記3種の位置に対して上下対称または左右対称の位置を含むことを特徴とする請求項2記載の高精細固体撮像装置。

【請求項5】 振動手段により振動される固体撮像素子の位置が、基準位置である第1の位置と、前記基準位置に対して水平左方向に1画素間隔移動した第2の位置と、前記基準位置に対して水平左方向に1/2画素間隔、垂直下方向に1/2画素間隔移動した第3の位置と、前記基準位置に対して水平右方向に1/2画素間隔、垂直下方向に1/2画素間隔移動した第4の位置もしくは上記4種の位置に対して上下対称または左右対称の位置を含むことを特徴とする請求項2記載の高精細固体撮像装置。

【請求項6】 振動手段は、固体撮像素子の前面の光軸内に電氣的刺激により屈折率が変化する物質を光軸に対して斜めに配置し、電氣的刺激を加えることで前記固体撮像素子と前記光軸の位置とを相対的に変化させるようにしたことを特徴とする請求項1記載の高精細固体撮像装

置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は固体撮像素子を振動させて高解像度化を実現する高精細固体撮像装置に関するものである。

【0002】

【従来の技術】 近年、固体撮像素子の高性能化が進み、ビデオカメラの撮像部には主に固体撮像素子が使用されている。特に民生用分野においては殆ど全てが固体撮像素子となり、業務用分野においても撮像管より置き変わりつつあるのが現状である。

【0003】 固体撮像素子は、従来のNTSC方式などの標準テレビ方式に対してはほぼ満足のできる性能が得られるようになった。しかしながら近年のマルチメディア化の流れに対して、文書などの細密な画像を入力しようとする場合には解像度が不足しており、リニアセンサー等を用いたスキャナーなどを用いる必要があった。しかし、スキャナーなどの1次元センサーを用いた場合、静止画しか取り込む事ができず、また入力のための時間が非常にかかる欠点があった。

【0004】 これに対し、2次元センサーを用いて高解像度を実現する方式として、固体撮像素子を周期的に振動させる方式が提案されている。この方式について図面を参照しながら説明する。

【0005】 図9は固体撮像素子を周期的に振動させる事により高解像度化を実現する、従来の高精細固体撮像装置の構成図の一例を示すものであり、図10は色フィルタの配置を表す図、図11はCCDの振動を説明するための図である。図9において、91は撮像レンズ、92はCCD固体撮像素子（以下CCDと表す）、93は色フィルタ、94は振動素子、95は振動信号発生回路、96はクロックドライバ、97はタイミング発生回路、98はサンプルホールド回路、99は信号処理回路である。このように構成された従来の撮像装置について以下その動作を説明する。

【0006】 まず撮像レンズ91を通して被写体より入射光がCCD92に入力され、CCD92より映像信号が出力される。そして出力映像信号はサンプルホールド回路98によって低雑音化され、信号処理回路99によりNTSC方式等のテレビ方式などに変換され、ビデオ信号として出力される。CCD92は、タイミング発生回路97によって発生されたCCD駆動信号がクロックドライバ96によりドライブされ、CCD92に入力される事で駆動される。

【0007】 またタイミング発生回路97より出力されたCCD駆動信号は振動信号発生回路95に入力され、CCD振動信号が出力されて振動素子94に送られることにより振動素子94が振動し、振動素子94に接続されているCCD92が振動する。ここで色フィルタ93

高精細固体撮像装置

特開平 7-245726

は図 10 に示されるように赤、緑、青の 3 色が CCD の 1 画素に対して 1 色づつ縦ストライプ状に配置しており、その繰り返し周期は 3 d となる。CCD 92 の振動振幅は、図 11 のようにフィールドごとに CCD の水平方向の画素間隔 d に対し 3 d / 2 だけ水平方向に振動するため、振動により 1 フィールドごとに水平方向に 3 d / 2 だけ CCD の画素の位置がずれた事になり、各色の画素がインターリーピングするため、A、B 両フィールドの画像を合成する事によって水平解像度が約 2 倍の映像を得る事ができる。

【0008】

【発明が解決しようとする課題】しかしながら上記従来の構成では、NTSC 方式等の標準テレビ方式に適合させるため、1 フレームを A と B の 2 つのフィールドで構成するインターレース撮像を行っており、フィールドごとに CCD を水平方向に振動させることで空間サンプリング点を増加させており、水平解像度しか向上しない。また A フィールドと B フィールドの両像を合成する場合、NTSC 方式の場合では A フィールドと B フィールドでは約 1 / 60 秒の時間差があるため、被写体に動きがある場合には画像がぶれてしまう問題点がある。

【0009】またこの方式では、カラー化のために R、G、B の 3 種類のフィルタを縦ストライプに配置しているが、水平方向の輝度信号の解像度は基本的に固体撮像素子の水平方向の画素数から求められる解像度の 1 / 3 となり、高解像度カラー入力装置としては満足できるものではない。また R、G、B フィルタを用いているため光の利用率が下がり、カメラの感度特性が低下する問題があった。

【0010】本発明は上記課題を解決するもので、被写体に動きが含まれる場合であってもぶれることなく高精細に撮像を可能にする高精細固体撮像装置を提供することを目的とする。

【0011】

【課題を解決するための手段】本発明は上記目的を達成するため、固体撮像素子と、前記固体撮像素子より出力される画像を記憶する記憶手段と、前記記憶手段出力より前記画像の動きを検出する動き検出手段と、前記動き検出手段出力に応じて振動信号を発生する振動信号発生手段と、前記振動信号により制御され、サンプリング点が異なるように前記固体撮像素子への入射光の光軸に対して少なくとも一方向に前記入射光の光軸または前記固体撮像素子を振動させる振動手段とを備え、前記画像が静止している場合のみ前記振動手段を動作させ、サンプリング点の異なる複数の画像を得る構成となっている。

【0012】

【作用】本発明によれば、上記のように固体撮像素子より出力される映像信号を記憶することにより、複数の映像信号より被写体の動きを検出し、被写体が静止している場合のみ CCD を振動させるようにすることで、ぶれ

のない高精細な映像信号を得る事ができる。

【0013】

【実施例】以下、本発明の実施例について、図面を参照しながら説明する。図 1 は、本発明の第 1 の実施例における高精細固体撮像装置の構成を示すものである。

【0014】図 1 において、1 は撮像レンズ、2 は CCD、3 は色フィルタ、4 は振動素子、5 は振動信号発生回路、6 はクロックドライバ、7 はタイミング発生回路、8 はサンプルホールド回路、9 は信号処理回路、10 1 は A / D 変換器、12 はフレームメモリー、14 は差分検出部、15 は動き検出部である。以上のように構成された本発明の第 1 の実施例の高精細固体撮像装置について、以下その動作を説明する。

【0015】まず、図 1 において、被写体より反射もしくは放射された光は、レンズ 1 と色フィルタ 3 を通って CCD 2 に入射され、映像信号に変換される。ここで CCD 2 は、タイミング発生回路 7 によって発生された CCD 駆動信号がクロックドライバ 6 により電圧変換され、CCD 2 に送られることにより駆動されている。

【0016】そして CCD 2 より出力された映像信号は、サンプルホールド回路 8 により低ノイズ化され、A / D 変換器 11 で A / D 変換された後、信号処理回路 9 に送られる。

【0017】また A / D 変換器 11 の出力はフレームメモリー 12 に接続されており、映像信号はフレームメモリー 12 に一旦記憶された後、次のフレームで差分検出部 14 に送られる。ここで、差分検出部 14 では、フレームメモリー 12 の出力と A / D 変換器 11 の出力との差分、すなわち現フレーム画像と前フレーム画像との差分を検出し、その差分検出出力により動き検出部 15 で被写体の動きを検出する。そしてもし被写体が静止していれば、1 フレームごとに振動信号発生回路 5 より CCD 振動信号を出力することで振動素子 4 を振動させ、振動素子 4 と接続されている CCD 2 を振動させる。これにより被写体が静止している場合には CCD 2 が振動することになり、1 フレームごとにサンプリング点の異なる複数の画像を得る事ができ、信号処理部 9 より得られたサンプリング点の異なる複数の画像を次段で合成することにより高精細な画像を得る事ができる。

【0018】ここで被写体が静止しており CCD 2 が振動している場合、CCD 出力映像信号は 1 フレームごとにサンプリング点が異なったものとなるため、差分検出部 14 の出力は CCD 2 を振動した成分がそのまま被写体の動きとして検出されてしまう。従って振動信号発生回路 5 より現在の CCD 2 の振動位置を差分検出部 14 に入力する事により CCD 2 の振動成分をあらかじめ除去している。

【0019】また CCD 2 が振動している場合、すなわち高精細画像が得られている場合には、動き検出部 15 より静止画判定フラグが出力されるため、信号処理回路

高解細固体撮像装置

特開平7-245726

9より通常の画像と高精細画像が混合して出力されても、外部でそれらの判別が可能となり、通常画像と高精細画像の分離を容易にすることができる。

【0020】以上のように本実施例によれば、映像信号より被写体の動きを検出し、被写体が静止しているときのみCCDを振動させることで、ぶれのない高品質な高精細画像を得ることができる。

【0021】次に図1における信号処理回路9の構成とCCD2の振動方法について、本発明の第2の実施例を挙げ、図面を参照しながら説明する。

【0022】図2は、本発明の第2の実施例における高精細固体撮像装置の構成を示すものである。図2において、1は撮像レンズ、2はCCD、3は色フィルタ、4は振動素子、5は振動信号発生回路、6はクロックドライバ、7はタイミング発生回路、8はサンプルホールド回路、9は信号処理回路、11はA/D変換器、12はフレームメモリ、14は差分検出部、15は動き検出部であって、これらは第1の実施例と同様の動作を行う。

【0023】16はローパスフィルタ、17は第1ラインメモリ、18は加算器、19は一画素遅延回路、20は減算器、21は第2ラインメモリ、22はマルチプレクサ、23は符号反転器である。

【0024】また図3は、本発明の第2の実施例における高精細固体撮像装置の、CCD2の前面に位置する色フィルタ3の色配置を示す図であり、図中Mgはマゼンダ、Gはグリーン、Yeはイエロー、Cyはシアンを表している。図4は、図3で表される色フィルタを用いて、CCDは全画素独立同時読み出し動作を行った場合の、各行より取り出される出力信号を示したものである。図5は輝度信号Yと色信号R-Y、B-Yのサンプリング点を示したものである。図6は、輝度信号と色差信号に着目した場合の振動方法を示す図、図7は、RG B原色信号に着目した場合の振動方法を示す図である。

【0025】以上のように構成された第2の実施例の高精細固体撮像装置について、以下その動作を説明する。本実施例における色フィルタの配列は、図3に示すように1行1列がマゼンダ、1行2列がグリーン、2行1列がイエロー、2行2列がシアン、3行1列がグリーン、3行2列がマゼンダ、4行1列がシアン、4行2列がイエローであって、この4行2列の組み合わせが水平方向と垂直方向に繰り返される構成である。なお、シアン色透過フィルタは青（ブルー）、緑（グリーン）の原色成分光を透過させ、マゼンダ色透過フィルタは青および赤（レッド）、イエロー色透過フィルタは赤及び緑色成分光を各々透過させるものである。

【0026】本実施例に用いるCCDは全画素独立同時読み出し動作のものをを用いる。従って従来の単板カラー化方式のCCDのように信号電荷の混合は行わないため、本実施例の配列に構成された色フィルタを用いて撮

像した場合の出力信号は、図4（a）のように第1行（nライン）ではマゼンダとグリーンが交互に出力され、また第2行（n+1ライン）ではイエローとシアンが交互に出力される。同様に第3行（n+2ライン）ではグリーンとマゼンダ、第4行（n+3ライン）ではシアンとイエローが交互に出力され、以後第5行以降は第1行から第4行までの繰り返しとなる。ここで図4では説明のため各画素に対応する色フィルタの原色成分赤、緑、青をR、G、Bで示した。

【0027】ここで各ラインより輝度及び色信号を取り出す方式について述べると、輝度信号Yは隣接する4つの画素Mg、G、Ye、Cyの平均値（ $2R+3G+2B$ ）として求められるため、図4（b）のようにnラインの信号とn+1ラインの信号を画素ごとに加算した後、それを平均化することで得られ、図5（a）で表される点がサンプリング点となる。

【0028】つぎに色信号は、R-Y成分についてはnラインとn+1ラインを画素ごとに加算した後、奇数番目の画素より偶数番目の画素を減算することで $2R-G$ なる色差信号が得られる。

【0029】

$$(Mg+Ye)-(G+Cy)=(2R+B+G)-(B+2G)=2R-G$$

またn+2ラインとn+3ラインについて同様の処理を行うことで、 $G-2R$ なる色差信号が得られる。従って、サンプリング点の間隔は輝度信号Yに対して水平方向に $1/2$ 、垂直方向に $1/2$ となり、図5（b）で表される点がサンプリング点となる。

【0030】B-Y成分についても、図4（d）で表されるようにn+1ラインとn+2ラインを画素ごとに加算した後、奇数番目の画素より偶数番目の画素を減算することで $G-2B$ なる色差信号が得られる。

【0031】

$$(Ye+G)-(Cy+Mg)=(R+2G)-(2B+R+G)=G-2B$$

またn+3ラインと、n+4、即ちnラインについて同様の処理を行うことで、 $2B-G$ なる色差信号が得られる。従って、B-Y成分についてもサンプリング点の間隔は、R-Y成分と同様に水平方向、垂直方向共に輝度信号Yの $1/2$ となり、図5（c）で表される点がサンプリング点となる。

【0032】これらの処理は図2の構成により実現される。CCD2より出力された映像信号は、サンプルホールド回路8で低ノイズ化され、A/D変換器11でA/D変換される。そして第1ラインメモリ17で1ライン期間遅延された信号と、遅延されない信号を加算器18で加算し、図4（b）の波形を得る。この信号に対しローパスフィルタ16を通すことによって輝度信号を得ることができる。また一画素遅延回路19で一画素遅延された信号から、遅延しない信号を減算器20により減算することで色差信号が得られる。

【0033】ここで色差信号は、ライン毎に $2R-G$ 、

高精細固体撮像装置

特開平7-245726

G-2B、G-2R、2B-Gの順に繰り返して得られるため、第2ラインメモリ21により1ライン期間遅延させ、マルチプレクサ22により1ライン遅延された信号と遅延しない信号とを切り替えて出力することによって2R-G、G-2R信号と2B-G、G-2B信号とが同時に得られるようにする。ここで各色差信号は1ライン毎に符号が反転しているため、符号反転器23によってそれぞれ符号を反転させることで2R-G、2B-G信号が得られる。

【0034】このように本実施例のフィルタ配列を用いることにより、輝度信号についてはサンプリング点がCCDの画素数と同様になり、画素数から求められる解像度とほぼ等しくなり、高解像度化が可能になる。また色差信号については輝度信号の1/4のサンプリング点であることから解像度も1/4となるが、色差信号の解像度は人間の視感度特性よりあまり必要ではなく十分である。

【0035】次にCCDの振動方法について述べると、上述のように第2の実施例における色フィルタ配列を用いた場合、輝度信号と色信号のサンプリング点は図5のように表される。この場合、CCDを振動することによりサンプリング点を变化させた複数の画像を取り込み、画像合成により高精細画像を生成するために簡単で且つ最も効果的な方法は、輝度信号、色信号共に格子状のサンプリング点の中心に新たにサンプリング点を設け、サンプリング点を千鳥格子(五ノ目)状にすれば良い。

【0036】これを実現するためには、輝度信号については、図6(a)のように、CCDの基準位置に対し、振動による移動後の画素位置が、CCDの水平方向の画素間隔Hの1/2と、垂直方向の画素間隔Vの1/2移動する必要がある。また、色信号についてはCCDの基準位置に対して水平方向に1H、垂直方向に1V移動する必要がある。この両者を実現するためには、基準位置に対し、第1番目の振動は水平方向に1/2H、垂直方向に1/2V、第2番目の振動は同じく水平方向に1/2H、垂直方向に1/2V、第3番目の振動は水平方向に-1H、垂直方向に-1V振動させ元の基準位置に戻し、以降はこの振動を繰り返せばよい。

【0037】これにより輝度信号、色信号共にCCDを振動させることにより得られる画像のサンプリング点を千鳥格子状にすることで、輝度信号、色差信号共に解像度を水平方向、垂直方向共に2倍にすることができ、効果的に高精細画像を得ることができる。

【0038】ここで振動振幅の水平方向と垂直方向の比が常に同じである場合は、振動方向が1次元となるため水平、垂直の2方向必要であった振動素子が1方向だけでよくなることから経済的に非常に有用である。

【0039】これまで振動とサンプリング点について輝度信号成分と色信号成分について考えてきたが、次にR、G、B3成分について考えると、前記Y、R-Y、

B-Yと同様に千鳥格子状にサンプリング点を設ければ良い。ここでR、G、B成分のサンプリング点は図4

(a)からもわかるように図7(a)のように表される。従ってR、G、B共にサンプリング点が千鳥格子状になる振動方法は、CCDの基準位置に対して、水平方向に1H、垂直方向移動無しの振動と、水平方向1/2H、垂直方向1/2Vのもの、水平方向-1/2H、垂直方向-1/2Vで表される点に移動すればよい。これにより図7(c)に示されるように各信号とも千鳥格子状にサンプリング点が位置するためR、G、B成分共に効果的に高精細画像を得ることが可能になる。

【0040】以上のように本実施例によれば、色フィルタに補色を用いているため色の利用率が高く、感度の高い高精細画像入力装置を提供することができる。また輝度信号と色差信号共に解像度の高い高精細固体撮像装置を提供することができる。

【0041】以下本発明の第3の実施例について、図面を参照しながら説明する。図8は、本発明の第3の実施例における高精細固体撮像装置の構成を示すものである。

【0042】図8において、1は撮像レンズ、2はCCD、3は色フィルタ、5は振動信号発生回路、6はクロックドライバ、7はタイミング発生回路、8はサンプルホールド回路、9は信号処理回路、11はA/D変換器、12はフレームメモリ、14は差分検出部、15は動き検出部であって、これらは第1の実施例と同様の動作を行う。31は光軸制御素子である。

【0043】以上のように構成された第3の実施例の高精細固体撮像装置について、以下その動作を説明する。

まず、被写体より放射もしくは反射された光はレンズ1を通して光軸制御素子31を通り色フィルタ3を通過してCCD2に入力される。ここで光軸制御素子31は、PLZT等の透明セラミックに電極を取り付けた構成になっており、光軸に対して斜めに配置されている。ここでPLZTは電気的刺激を加えるとその誘電率が変化する性質があり、すなわち入射光に対して屈折率が変化する。したがって光軸に対して斜めに光軸制御素子31を配置し、信号発生回路5より出力される振動信号を光軸制御素子31に加えることによって振動信号に応じて光軸制御素子31の屈折率が変化し、光軸を移動させることができるため、固体撮像素子を振動させるのと同じ効果が得られる。

【0044】以上のように本実施例によれば、CCDを機械的に振動させることなく同様の効果を得ることができるため、寿命が長く、また機械的衝撃に強い高精細固体撮像装置を提供することができる。

【0045】

【発明の効果】以上のように本発明によれば、固体撮像素子より出力される映像信号より被写体の動きを検出し、被写体が静止しているときのみCCDを振動させる

高精細固体撮像装置

特開平 7 - 2 4 5 7 2 6

ことで、ぶれのない高精細画像を得ることができる優れた高精細固体撮像装置を実現できるものである。

【図面の簡単な説明】

【図１】本発明の第１の実施例における高精細固体撮像装置の構成を示すブロック図

【図2】本発明の第2の実施例における高精細固体撮像装置の構成を示すブロック図

【図3】同固体撮像素子前面に位置する色フィルタの色配置を示す図

【図4】 同固体撮像素子の各行より取り出される出力信号を表す図

【図5】同輝度信号と色信号のサンプリング点を示す図

【図6】同輝度信号と色差信号に着目した場合の振動方法を示す図

【図7】同RGB原色信号に着目した場合の振動方法を示す図

【図 8】本発明の第 3 の実施例における高精細固体撮像装置の構成を示すブロック図

【図 9】従来の高精細固体撮像装置の構成を示すブロック図

【図 10】従来の高精細固体撮像装置の色フィルタの配置を示す図

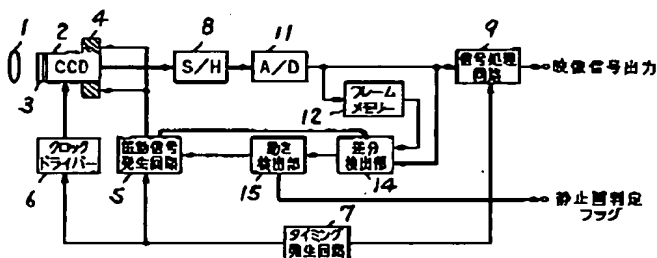
【図 11】従来の高精細固体撮像装置の CCD の振動を示す図

05 【符号の説明】

- 1 撮像レンズ
- 2 CCD
- 3 色フィルタ
- 4 振動素子
- 5 振動信号発生回路
- 6 クロックドライバ
- 7 タイミング発生回路
- 8 サンプルホールド回路
- 9 信号処理回路
- 11 A/D変換器
- 12 フレームメモリー
- 14 差分検出部
- 15 動き検出部
- 31 光軸制御素子

20

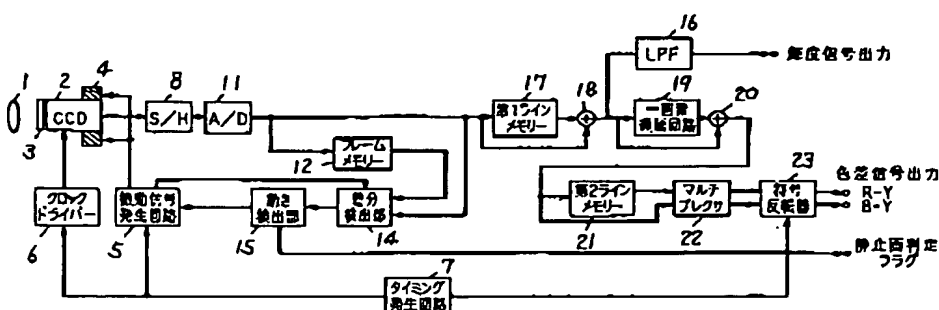
【图 1】



【例 3】

Mg	G	Mg	G	Mg	G	Mg
Ye	Cy	Ye	Cy	Ye	Cy	Ye
G	Mg	G	Mg	G	Mg	G
Cy	Ye	Cy	Ye	Cy	Ye	Cy
Mg	G	Mg	G	Mg	G	Mg
Ye	Cy	Ye	Cy	Ye	Cy	Ye
G	Mg	G	Mg	G	Mg	G

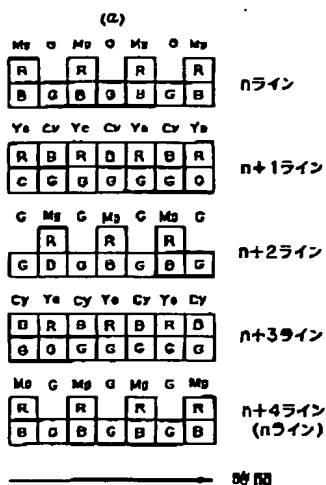
【图 2】



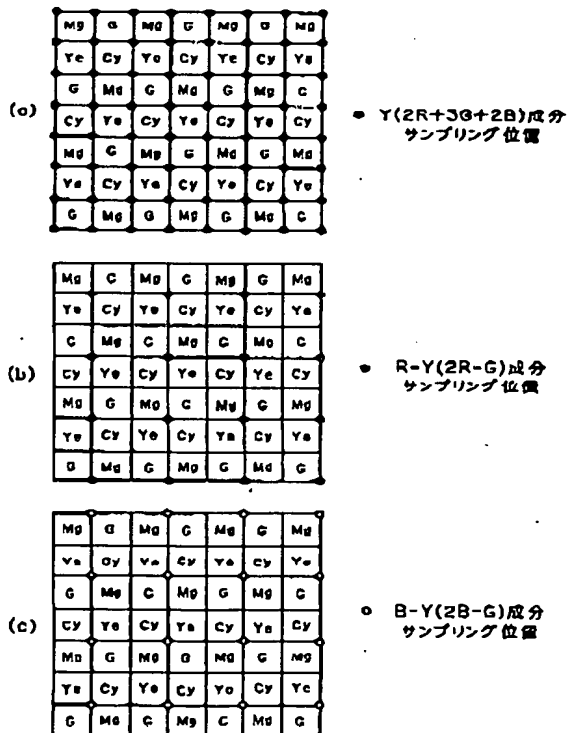
高精細固体撮像装置

特開平7-245726

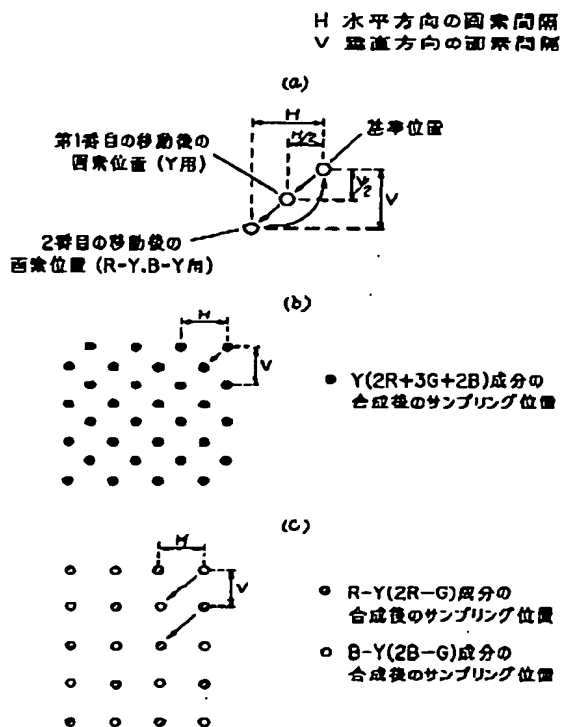
【図4】



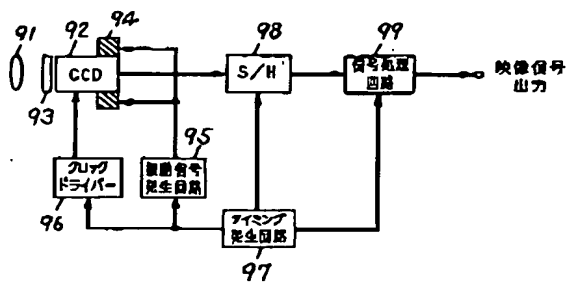
【図5】



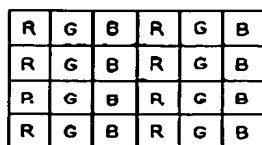
【図6】



【図9】



【図10】

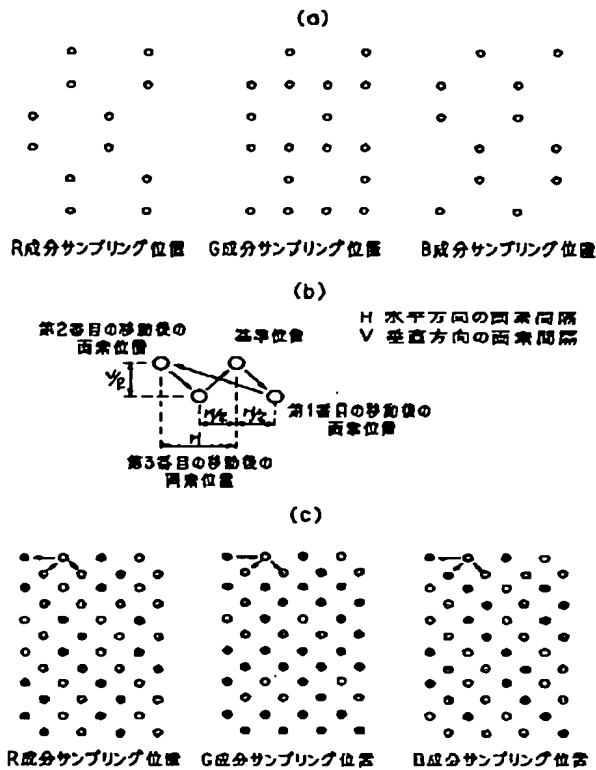


RGB縦ストライプ配置

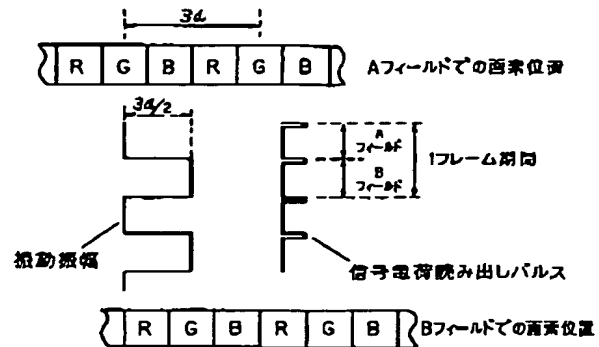
高精細固体撮像装置

特開平7-245726

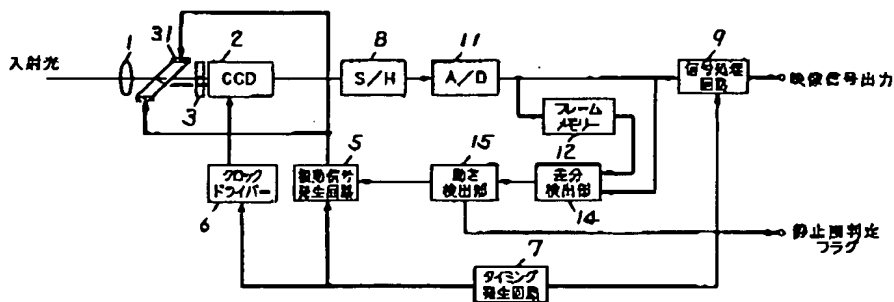
【図7】



【図11】



【図8】



CLAIMS

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[Claim(s)]

[Claim 1] The highly minute solid state camera which it has the following, the aforementioned oscillating means is operated only when the aforementioned picture is standing it still, and is characterized by being constituted so that two or more pictures from which a sampling point differs may be acquired. Solid state image pickup device A storage means to memorize the picture outputted from the aforementioned solid state image pickup device A movement detection means to detect the movement of the aforementioned picture from the aforementioned storage means output An oscillating signal generation means to generate an oscillating signal according to the aforementioned movement detection means output, and an oscillating means to, vibrate the optical axis or the aforementioned solid state image pickup device of the aforementioned incident light to ** on the other hand at least to the optical axis of the incident light to the aforementioned solid state image pickup device so that it may be controlled by the oscillating signal outputted from the aforementioned oscillating signal generation means and sampling points may differ

[Claim 2] One-line one train a solid state image pickup device MAZENDA, [the array of a light filter] Cyanogen, and three-line one train Green, [one line two trains] [green, and two-line one train] [yellow, and two-line two trains] For three-line two trains, MAZENDA, and four-line one train are [cyanogen, and four line two trains] yellow. The highly minute solid state camera according to claim 1 which is this array combine or the combination of the vertical symmetry or a bilateral symmetry is repeated by whose horizontal direction and perpendicular direction, and is characterized by the signal read-out method reading all pixels independently simultaneously.

[Claim 3] Vibration of the solid state image pickup device generated by the oscillating means is a highly minute solid state camera according to claim 2 which possesses two or more amplitude a perpendicular direction [a horizontal direction], and is characterized by the ratio of a horizontal amplitude and a vertical amplitude being always the same.

[Claim 4] The highly minute solid state camera according to claim 2 characterized by providing the following The 1st position whose position of the solid state image pickup device which vibrates by the oscillating means is a criteria position The 2nd position which carried out 1/2-pixel interval movement leftward [level] to the aforementioned criteria position a 1/2-pixel interval and perpendicular down It is the position of the vertical symmetry or a bilateral symmetry to the 3rd position or the three above-mentioned sorts of positions which carried out 1-pixel interval movement leftward [level] a 1-pixel interval and perpendicular down to the aforementioned criteria position.

[Claim 5] The highly minute solid state camera according to claim 2 characterized by providing the following The 1st position whose position of the solid state image pickup device which vibrates by the oscillating means is a criteria position The 2nd position which carried out 1-pixel interval movement leftward [level] to the aforementioned criteria position The 3rd position which carried out 1/2-pixel interval movement leftward [level] to the aforementioned criteria position a 1/2-pixel interval and perpendicular down It is the position of the vertical symmetry or a bilateral symmetry to the 4th position or the four above-mentioned sorts of

positions which carried out 1/2-pixel interval movement rightward [level] a 1/2-pixel interval and perpendicular down to the aforementioned criteria position.

[Claim 6] An oscillating means is a highly minute solid state camera according to claim 1 characterized by making it change relatively the aforementioned solid state image pickup device and the position of the aforementioned optical axis by arranging aslant the matter from which a refractive index changes with electric stimuli to an optical axis, and adding an electric stimulus in the optical axis of the front face of a solid state image pickup device.

DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the highly minute solid state camera which a solid state image pickup device is vibrated and realizes high resolution-ization.

[0002]

[Description of the Prior Art] In recent years, highly efficient-ization of a solid state image pickup device progresses, and the solid state image pickup device is mainly used for the image pck-up section of a video camera. The present condition is all almost serving as a solid state image pickup device especially in a noncommercial field, and placing and changing from an image pick-up tube also in a business-use field.

[0003] The performance to which a solid state image pickup device is mostly made as for satisfaction to standard television methods, such as the conventional NTSC color TV system, came to be obtained. However, to the flow of multimedia-izing in recent years, when it was going to input minute pictures, such as a document, resolution ran short, and the scanner using the linear sensor etc. needed to be used. However, when 1-dimensional sensors, such as a scanner, were used, there was a fault which can incorporate only a still picture and takes the time for an input very much.

[0004] On the other hand, the method which vibrates a solid state image pickup device periodically is proposed as a method which realizes high resolution using a two-dimensional sensor. It explains referring to a drawing about this method.

[0005] Drawing and drawing 11 to which drawing 9 shows an example of the block diagram of the conventional highly minute solid state camera which realizes high resolution-ization by vibrating a solid state image pickup device periodically to, and drawing 10 expresses arrangement of a color filter are drawing for explaining vibration of CCD. drawing 9 -- setting -- 91 -- an image pck-up lens and 92 -- a CCD solid state image pickup device (it expresses Following CCD) and 93 -- for an oscillating signal generating circuit and 96, as for a timing generating circuit and 98, a clock driver and 97 are [a color filter and 94 / an oscillating element and 95 / a sample hold circuit and 99] digital disposal circuits Thus, the operation is explained below about the constituted conventional image pck-up equipment.

[0006] An incident light is first inputted into CCD92 by the photographic subject through the image pck-up lens 91, and a video signal is outputted from CCD92. And an output video signal is formed into low noise by

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the sample hold circuit 98, is changed into television methods, such as an NTSC color TV system, etc. by the digital disposal circuit 99, and is outputted as a video signal. The CCD driving signal generated by the timing generating circuit 97 is driven by the clock driver 96, and drives CCD92 in being inputted into CCD92.

[0007] Moreover, by inputting into the oscillating signal generating circuit 95 the CCD driving signal outputted from the timing generating circuit 97, outputting a CCD oscillating signal, and being sent to the oscillating element 94, the oscillating element 94 vibrates and CCD92 connected to the oscillating element 94 vibrates. As shown in drawing 10, three colors of red, green, and blue arrange one color of color filters 93 in the shape of [each] a vertical stripe to 1 pixel of CCD, and the repeat period is set to $3d$ here. In order that it may mean that the position of the pixel of CCD had shifted horizontally for every field by vibration since only $3d/2$ vibrate horizontally to the horizontal pixel interval d of CCD for every field like drawing 11, and the pixel of each color may carry out the interleaving only of $3d/2$, when the vibration amplitude of CCD92 compounds the picture of A and the B car field, horizontal resolution can obtain a twice [about] as many image as this.

[0008]

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional composition, in order to make standard television methods, such as an NTSC color TV system, suit, the interlace image pick-up which constitutes one frame in the two fields, A and B, is performed, the space sampling point is made to increase by vibrating CCD horizontally for every field, and only horizontal resolution improves. Moreover, since there is about 1 / time difference for 60 seconds in A field and B field in the case of an NTSC color TV system when compounding the picture of A field and B field, when a photographic subject has movement, there is a trouble that a picture blurs.

[0009] Moreover, although three kinds of filters, R, G, and B, are arranged for the vertical stripe for colorization, the resolution of a horizontal luminance signal is set to one third of the resolution fundamentally called for from the horizontal number of pixels of a solid state image pickup device, and it cannot be satisfied [with this method] of resolution as a high resolution color input unit. Moreover, since R, G, and B filter were used, the utilization factor of light fell, and there was a problem to which the sensitivity property of a camera falls.

[0010] this invention solves the above-mentioned technical problem, and it aims at offering the highly minute solid state camera which makes an image pick-up possible with high definition, without blurring, even if it is the case where movement is contained in a photographic subject.

[0011]

[Means for Solving the Problem] A storage means to memorize the picture outputted from a solid state image pickup device and the aforementioned solid state image pickup device in order that this invention may attain the above-mentioned purpose, A movement detection means to detect the movement of the aforementioned picture from the aforementioned storage means output, and an oscillating signal generation means to generate an oscillating signal according to the aforementioned movement detection means output, It is controlled by the aforementioned oscillating signal and has an oscillating means to, vibrate the optical axis or the aforementioned solid state image pickup device of the aforementioned incident light to ** on the other hand at least to the optical axis of the incident light to the aforementioned solid state image pickup device so

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that sampling points may differ. Only when the aforementioned picture is standing it still, the aforementioned oscillating means is operated, and it has the composition of acquiring two or more pictures from which a sampling point differs.

[0012]

[Function] According to this invention, a high definition video signal without blurring can be obtained by making it vibrate CCD, only when a photographic subject's movement is detected and the photographic subject is standing it still from two or more video signals by memorizing the video signal outputted from a solid state image pickup device as mentioned above.

[0013]

[Example] Hereafter, the example of this invention is explained, referring to a drawing. Drawing 1 shows the composition of the highly minute solid state camera in the 1st example of this invention.

[0014] drawing 1 -- setting -- 1 -- an image pick-up lens and 2 -- CCD and 3 -- a color filter and 4 -- an oscillating element and 5 -- an oscillating signal generating circuit and 6 -- a clock driver and 7 -- a timing generating circuit and 8 -- a sample hold circuit and 9 -- a digital disposal circuit and 11 -- an A/D converter and 12 -- a frame memory and 14 -- difference -- a detecting element and 15 are movement detecting elements About the highly minute solid state camera of the 1st example of this invention constituted as mentioned above, the operation is explained below.

[0015] First, incidence of the light which set to drawing 1, and was reflected or emitted by the photographic subject is carried out to CCD2 through a lens 1 and a color filter 3, and it is changed into a video signal. Voltage conversion of the CCD driving signal generated by the timing generating circuit 7 is carried out by the clock driver 6, and CCD2 is driven by being sent to CCD2 here.

[0016] And after the video signal outputted from CCD2 is formed into a low noise by the sample hold circuit 8 and A/D conversion is carried out by A/D converter 11, it is sent to a digital disposal circuit 9.

[0017] moreover, the frame of a degree once the output of A/D converter 11 is connected to the frame memory 12 and the video signal was memorized by the frame memory 12 -- difference -- it is sent to a detecting element 14 here -- difference -- a detecting element 14 -- the difference of the output of a frame memory 12, and the output of A/D converter 11, i.e., the difference of the present frame picture and a front frame picture, -- detecting -- the difference -- it moves by the detection output and a photographic subject's movement is detected by the detecting element 15 And if the photographic subject is standing it still, for every frame, the oscillating element 4 will be vibrated with outputting a CCD oscillating signal from the oscillating signal generating circuit 5, and CCD2 connected with the oscillating element 4 will be vibrated. A high definition picture can be acquired by compounding two or more pictures from which the sampling point which CCD2 will vibrate when the photographic subject is standing it still by this, and could acquire two or more pictures from which a sampling point differs for every frame, and was obtained from the signal-processing section 9 differs by the next step.

[0018] since a CCD output video signal becomes that from which the sampling point differed for every frame when the photographic subject is standing it still here and CCD2 is vibrating -- difference -- the component for which the output of a detecting element 14 vibrated CCD2 will be detected as a photographic subject's movement as it is therefore, the oscillating position of CCD2 of present [signal generating circuit /

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oscillating / 5] -- difference -- the oscillating component of CCD2 is beforehand removed by inputting into a detecting element 14

[0019] Moreover, since a still picture judging flag is outputted from the movement detecting element 15 when CCD2 is vibrating (i.e., when the highly minute picture is acquired), even if a usual picture and a usual highly minute picture are mixed and are outputted from a digital disposal circuit 9, those distinction is attained externally and separation of a picture and a highly minute picture can usually be made easy.

[0020] A quality highly minute picture without blurring can be acquired by vibrating CCD, only while a photographic subject's movement is detected and the photographic subject is standing it still from the video signal according to this example as mentioned above.

[0021] Next, it explains, giving the 2nd example of this invention and referring to a drawing about the composition of a digital disposal circuit 9 and the oscillating method of CCD2 in drawing 1 .

[0022] Drawing 2 shows the composition of the highly minute solid state camera in the 2nd example of this invention. drawing 2 -- setting -- 1 -- an image pick-up lens and 2 -- CCD and 3 -- a color filter and 4 -- an oscillating element and 5 -- an oscillating signal generating circuit and 6 -- a clock driver and 7 -- a timing generating circuit and 8 -- a sample hold circuit and 9 -- a digital disposal circuit and 11 -- an A/D converter and 12 -- a frame memory and 14 -- difference -- a detecting element and 15 are movement detecting elements, and these perform the same operation as the 1st example

[0023] 16 -- a low pass filter and 17 -- for a 1-pixel delay circuit and 20, as for the 2nd line memory and 22, a subtractor and 21 are [the 1st line memory and 18 / an adder and 19 / a multiplexer and 23] sign inverters

[0024] Moreover, drawing 3 is drawing showing the color arrangement of a color filter 3 located in the front face of CCD2 of the highly minute solid state camera in the 2nd example of this invention, in MAZENDA and G, green and Ye express yellow and, as for the inside Mg of drawing, Cy expresses cyanogen. CCD shows the output signal taken out from each line at the time of performing all pixel independent simultaneous read-out operation using the color filter with which drawing 4 is expressed with drawing 3 . Drawing 5 shows the sampling point of a luminance signal Y, chrominance-signal R-Y, and B-Y. Drawing and drawing 7 which show the oscillating method when drawing 6 pays its attention to a luminance signal and a color-difference signal are drawing showing the oscillating method at the time of paying one's attention to a RGB primary signal.

[0025] About the highly minute solid state camera of the 2nd example constituted as mentioned above, the operation is explained below. As the array of the color filter in this example is shown in drawing 3 , for green, and three-line two trains, MAZENDA, and four-line one train are [green, and two line one train / yellow, and two line two trains / cyanogen, and three line one train / cyanogen, and four line two trains] yellow, and one-line one train is [MAZENDA, and one line two trains] the composition that the combination of these four-line two trains is repeated by an In addition, a cyano color transparency filter makes blue (blue) and a green (green) primary color component light penetrate, and blue and red (red), and a yellow color transparency filter make red and green component light penetrate [filter / MAZENDA color transparency] respectively.

[0026] CCD used for this example uses the thing of all pixel independent simultaneous read-out operation. Therefore, like CCD of the conventional veneer colorization method, by the 1st line (n lines), MAZENDA and green are outputted by turns like drawing 4 (a), and, as for the output signal at the time of picturizing using

the color filter constituted by the array of this example, in order not to perform mixture of a signal charge, yellow and cyanogen are outputted by turns by the 2nd line (n+1 line). Similarly, by green, MAZENDA, and the 4th line (n+3 lines), cyanogen and yellow are outputted by turns and it becomes a repeat to the 4th line from the 1st line henceforth at the 3rd line (n+2 lines) after the 5th line. By drawing 4, R, G, and B showed the primary color color component red of the color filter corresponding to each pixel, green, and blue here for explanation.

[0027] If the method which takes out brightness and a chrominance signal from each line here is described, since a luminance signal Y will be called for as the average $(2R+3G+2B)$ of four adjoining pixels Mg, G, Ye, and Cy, After adding the signal of n lines, and the signal of n+1 line for every pixel like drawing 4 (b), the point which is acquired by equalizing it and is expressed with drawing 5 (a) turns into a sampling point.

[0028] Next, after a chrominance signal adds n lines and n+1 line for every pixel about a R-Y component, the color-difference signal which consists of the odd-numbered pixel $2R-G$ by subtracting the even-numbered pixel is obtained.

[0029]

$(Mg+Ye) - (G+Cy) = (2R+B+G) - (B+2G) = 2R-G$ -- performing processing same about n+2 lines and n+3 lines $2R-G$ again -- $G-2R$ -- a color-difference signal is obtained Therefore, the interval of a sampling point is horizontally set to one half to a luminance signal Y at $1/2$ and a perpendicular direction, and the point expressed with drawing 5 (b) turns into a sampling point.

[0030] After adding n+1 line and n+2 lines for every pixel also about a B-Y component so that it may be expressed with drawing 4 (d), the color-difference signal which $G-2B$ Consists of the odd-numbered pixel by subtracting the even-numbered pixel is obtained.

[0031]

$(Ye+G)$ The color-difference signal which $2B-G$ Becomes $-(Cy+Mg) = (R+2G) - (2B+R+G) = G-2B$ and n+3 lines by performing n+4, i.e., the processing same about n lines, is obtained. Therefore, about a B-Y component as well as a R-Y component, as for the interval of a sampling point, a horizontal direction and a perpendicular direction are set to one half of luminance signals Y, and the point expressed with drawing 5 (c) turns into a sampling point.

[0032] These processings are realized by the composition of drawing 2. The video signal outputted from CCD2 is formed into a low noise with a sample hold circuit 8, and A/D conversion is carried out by A/D converter 11. And the signal by which one-line period delay was carried out by the 1st line memory 17, and the signal which is not delayed are added with an adder 18, and the wave of drawing 4 (b) is acquired. A luminance signal can be obtained by letting a low pass filter 16 pass to this signal. Moreover, a color-difference signal is obtained by subtracting the signal which is not delayed by the subtractor 20 from the signal delayed by the 1-pixel delay circuit 19 1 pixel.

[0033] Since a color-difference signal is obtained here and obtained by the repeat in order of $2R-G$ and $G-2B$, $G-2R$, and $2B-G$ for every line, One-line period delay is carried out by the 2nd line memory 21, and a $2R-G$ and $G-2R$ signal and a $2B-G$ and $G-2B$ signal are simultaneously acquired by changing and outputting the signal delayed one line by the multiplexer 22, and the signal which is not delayed. Since the sign has reversed each color-difference signal for every line, $2R-G$ and a $2B-G$ signal are acquired by reversing a sign

by the sign inverter 23, respectively here.

[0034] Thus, by using the filter array of this example, about a luminance signal, a sampling point becomes being the same as that of the number of pixels of CCD, it becomes almost equal to the resolution called for from the number of pixels, and high resolution-ization is attained. Moreover, although resolution is also set to one fourth about a color-difference signal since it is one fourth of the sampling points of a luminance signal, the resolution of a color-difference signal is not so required, and is more enough than human being's visibility property.

[0035] Next, when the oscillating method of CCD was described and the color filter array in the 2nd example is used as mentioned above, the sampling point of a luminance signal and a chrominance signal is expressed like drawing 5. In this case, a luminance signal and a chrominance signal newly prepare a sampling point in the middle point of a grid-like sampling point, and the most effective method that it is easy in order to incorporate two or more pictures to which the sampling point was changed by vibrating CCD and for picture composition to generate a highly minute picture and should just make a sampling point the shape of a hound's-tooth check (5 NO eye).

[0036] $1/2$ of one half of the pixel intervals H of CCD with the horizontal pixel position after movement according [as opposed to / the criteria position of CCD / like / luminance signal / drawing 6 (a) / in order to realize this] to vibration, and the vertical pixel interval V -- it is necessary to move. Moreover, it is necessary to move to $1H$ and a perpendicular direction $1V$ horizontally to the criteria position of CCD about a chrominance signal. What is necessary is for $1/2V$ and the 2nd vibration to vibrate to $1/2H$ and a perpendicular direction, and for $1/2V$ and the 3rd vibration to vibrate $1/2H$ and a perpendicular direction $-1V$ to $-1H$ and a perpendicular direction horizontally, to return [as opposed to / a criteria position / in order to realize these both] the 1st vibration to the original criteria position, and just to repeat this vibration similarly and horizontally, horizontally, henceforth.

[0037] By making into the shape of a hound's-tooth check the sampling point of the picture acquired when a luminance signal and a chrominance signal vibrate CCD by this, a luminance signal and a color-difference signal can be ****ed resolution horizontally, it can be perpendicularly made into double precision, and a highly minute picture can be acquired effectively.

[0038] Since the oscillating direction becomes one dimension when the ratio of the horizontal direction of a vibration amplitude and a perpendicular direction is always the same, the oscillating element which was the horizontal and vertical 2-way need requires only one direction, and is very useful economically from a bird clapper here.

[0039] What is necessary is just to prepare a sampling point in the shape of a hound's-tooth check like Above Y, R-Y, and B-Y, if R, G, and B3 component is considered below, although the luminance-signal component and the chrominance-signal component have so far been considered about vibration and the sampling point. It is expressed that the sampling point of R, G, and B component is understood also from drawing 4 (a) here like drawing 7 (a). Therefore, the oscillating method that a sampling point becomes hound's-tooth check-like in R, G, and B is the thing of the vibration horizontally without $1H$ and perpendicular direction movement, and horizontal directions $1/2H$ and perpendicular directions $1/2V$, and a horizontal direction to the criteria position of CCD. - They are $1/2H$ and a perpendicular direction. - What is necessary is just to move to the

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point expressed with $1/2V$. As shown in drawing 7 (c) by this, it enables R, G, and B component to acquire a highly minute picture for each signal effectively, since a sampling point is located in the shape of a hound's-tooth check.

[0040] As mentioned above, according to this example, since the complementary color is used for the color filter, the utilization factor of a color is high and can offer a highly minute picture input device with high sensitivity. Moreover, a luminance signal and a color-difference signal can offer a highly minute solid state camera with high resolution.

[0041] The 3rd example of this invention is explained below, referring to a drawing. Drawing 8 shows the composition of the highly minute solid state camera in the 3rd example of this invention.

[0042] drawing 8 -- setting -- 1 -- an image pick-up lens and 2 -- CCD and 3 -- a color filter and 5 -- an oscillating signal generating circuit and 6 -- a clock driver and 7 -- a timing generating circuit and 8 -- a sample hold circuit and 9 -- a digital disposal circuit and 11 -- an A/D converter and 12 -- a frame memory and 14 -- difference -- a detecting element and 15 are movement detecting elements, and these perform the same operation as the 1st example 31 is an optical-axis controlling element.

[0043] About the highly minute solid state camera of the 3rd example constituted as mentioned above, the operation is explained below. First, the light emitted or reflected is inputted into CCD2 by the photographic subject through a color filter 3 through the optical-axis controlling element 31 through a lens 1. The optical-axis controlling element 31 has the composition of having attached the electrode in transparent ceramics, such as PLZT, and is aslant arranged to the optical axis here. PLZT has the property in which the dielectric constant will change if an electric stimulus is added, namely, a refractive index changes to an incident light here. Therefore, the optical-axis controlling element 31 is aslant arranged to an optical axis, and since the refractive index of the optical-axis controlling element 31 can change according to an oscillating signal and an optical axis can be moved by adding the oscillating signal outputted from the signal signal generating circuit 5 to the optical-axis controlling element 31, the same effect as vibrating a solid state image pickup device is acquired.

[0044] Since the same effect can be acquired as mentioned above according to this example, without vibrating CCD mechanically, a life can offer a highly minute solid state camera strong against a mechanical shock for a long time.

[0045]

[Effect of the Invention] The outstanding highly minute solid state camera which can acquire a highly minute picture without blurring by vibrating CCD only while a photographic subject's movement is detected and the photographic subject is standing it still from the video signal outputted from a solid state image pickup device according to this invention as mentioned above is realizable.

TECHNICAL FIELD

[Industrial Application] this invention relates to the highly minute solid state camera which a solid state image pickup device is vibrated and realizes high resolution-ization.

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PRIOR ART

[Description of the Prior Art] In recent years, highly efficient-ization of a solid state image pickup device progresses, and the solid state image pickup device is mainly used for the image pick-up section of a video camera. The present condition is all almost serving as a solid state image pickup device especially in a noncommercial field, and placing and changing from an image pick-up tube also in a business-use field.

[0003] The performance to which a solid state image pickup device is mostly made as for satisfaction to standard television methods, such as the conventional NTSC color TV system, came to be obtained. However, to the flow of multimedia-izing in recent years, when it was going to input minute pictures, such as a document, resolution ran short, and the scanner using the linear sensor etc. needed to be used. However, when 1-dimensional sensors, such as a scanner, were used, there was a fault which can incorporate only a still picture and takes the time for an input very much.

[0004] On the other hand, the method which vibrates a solid state image pickup device periodically is proposed as a method which realizes high resolution using a two-dimensional sensor. It explains referring to a drawing about this method.

[0005] Drawing and drawing 11 to which drawing 9 shows an example of the block diagram of the conventional highly minute solid state camera which realizes high resolution-ization by vibrating a solid state image pickup device periodically to, and drawing 10 expresses arrangement of a color filter are drawing for explaining vibration of CCD. drawing 9 -- setting -- 91 -- an image pick-up lens and 92 -- a CCD solid state image pickup device (it expresses Following CCD) and 93 -- for an oscillating signal generating circuit and 96, as for a timing generating circuit and 98, a clock driver and 97 are [a color filter and 94 / an oscillating element and 95 / a sample hold circuit and 99] digital disposal circuits Thus, the operation is explained below about the constituted conventional image pick-up equipment.

[0006] An incident light is first inputted into CCD92 by the photographic subject through the image pick-up lens 91, and a video signal is outputted from CCD92. And an output video signal is formed into low noise by the sample hold circuit 98, is changed into television methods, such as an NTSC color TV system, etc. by the digital disposal circuit 99, and is outputted as a video signal. The CCD driving signal generated by the timing generating circuit 97 is driven by the clock driver 96, and drives CCD92 in being inputted into CCD92.

[0007] Moreover, by inputting into the oscillating signal generating circuit 95 the CCD driving signal outputted from the timing generating circuit 97, outputting a CCD oscillating signal, and being sent to the oscillating element 94, the oscillating element 94 vibrates and CCD92 connected to the oscillating element 94 vibrates. As shown in drawing 10, three colors of red, green, and blue arrange one color of color filters 93 in the shape of [each] a vertical stripe to 1 pixel of CCD, and the repeat period is set to $3d$ here. In order that it may mean that the position of the pixel of CCD had shifted horizontally for every field by vibration since only $3d/2$ vibrate horizontally to the horizontal pixel interval d of CCD for every field like drawing 11, and the pixel of each color may carry out the interleaving only of $3d/2$, when the vibration amplitude of CCD92 compounds the picture of A and the B car field, horizontal resolution can obtain a twice [about] as

many image as this.

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EFFECT OF THE INVENTION

[Effect of the Invention] The outstanding highly minute solid state camera which can acquire a highly minute picture without blurring by vibrating CCD only while a photographic subject's movement is detected and the photographic subject is standing it still from the video signal outputted from a solid state image pickup device according to this invention as mentioned above is realizable.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional composition, in order to make standard television methods, such as an NTSC color TV system, suit, the interlace image pck-up which constitutes one frame in the two fields, A and B, is performed, the space sampling point is made to increase by vibrating CCD horizontally for every field, and only horizontal resolution improves. Moreover, since there is about 1 / time difference for 60 seconds in A field and B field in the case of an NTSC color TV system when compounding the picture of A field and B field, when a photographic subject has movement, there is a trouble that a picture blurs.

[0009] Moreover, although three kinds of filters, R, G, and B, are arranged for the vertical stripe for colorization, the resolution of a horizontal luminance signal is set to one third of the resolution fundamentally called for from the horizontal number of pixels of a solid state image pickup device, and it cannot be satisfied [with this method] of resolution as a high resolution color input unit. Moreover, since R, G, and B filter were used, the utilization factor of light fell, and there was a problem to which the sensitivity property of a camera falls.

[0010] this invention solves the above-mentioned technical problem, and it aims at offering the highly minute solid-state camera which makes an image pck-up possible with high definition, without blurring, even if it is the case where movement is contained in a photographic subject.

MEANS

[Means for Solving the Problem] A storage means to memorize the picture outputted from a solid state image pickup device and the aforementioned solid state image pickup device in order that this invention may attain the above-mentioned purpose, A movement detection means to detect the movement of the aforementioned picture from the aforementioned storage means output, and an oscillating signal generation means to generate an oscillating signal according to the aforementioned movement detection means output, It is controlled by the aforementioned oscillating signal and has an oscillating means to, vibrate the optical axis or

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the aforementioned solid state image pickup device of the aforementioned incident light to ** on the other hand at least to the optical axis of the incident light to the aforementioned solid state image pickup device so that sampling points may differ. Only when the aforementioned picture is standing it still, the aforementioned oscillating means is operated, and it has the composition of acquiring two or more pictures from which a sampling point differs.

OPERATION

[Function] According to this invention, a high definition video signal without blurring can be obtained by making it vibrate CCD, only when a photographic subject's movement is detected and the photographic subject is standing it still from two or more video signals by memorizing the video signal outputted from a solid state image pickup device as mentioned above.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the composition of the highly minute solid state camera in the 1st example of this invention

[Drawing 2] The block diagram showing the composition of the highly minute solid state camera in the 2nd example of this invention

[Drawing 3] Drawing showing the color arrangement of a color filter located in the front face of the said solid state image pickup device

[Drawing 4] Drawing showing the output signal taken out from each line of this solid state image pickup device

[Drawing 5] Drawing showing the sampling point of this luminance signal and a chrominance signal

[Drawing 6] Drawing showing the oscillating method at the time of paying one's attention to this luminance signal and a color-difference signal

[Drawing 7] Drawing showing the oscillating method at the time of paying one's attention to this RGB primary signal

[Drawing 8] The block diagram showing the composition of the highly minute solid state camera in the 3rd example of this invention

[Drawing 9] The block diagram showing the composition of the conventional highly minute solid state camera

[Drawing 10] Drawing showing arrangement of the color filter of the conventional highly minute solid state camera

[Drawing 11] Drawing showing vibration of CCD of the conventional highly minute solid state camera

[Description of Notations]

1 Image Pck-up Lens

2 CCD
3 Color Filter
4 Oscillating Element
5 Oscillating Signal Generating Circuit
6 Clock Driver
7 Timing Generating Circuit
8 Sample Hold Circuit
9 Digital Disposal Circuit
11 A/D Converter
12 Frame Memory
14 Difference -- Detecting Element
15 Movement Detecting Element
31 Optical-Axis Controlling Element

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